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ABSTRACT

This study investigates 16 personality factors and their relevance to the swimming proficiency of physical education students at Wisconsin State University-River Falls. Two instruments, a swimming skills test and the Cattell Sixteen Personality Factor Questionnaire, were utilized. The major hypotheses tested include: (1) there is no difference between swimmers and nonswimmers on 16 primary personality factors and 7 composite second order factors; and (2) there is no difference between male and female swimmers on these same personality dimensions. A review of the relevant literature, the methodology, findings, and conclusions are reported extensively. Statistical analysis indicates few personality differences between swimmers and nonswimmers but a number of differences between the sexes. The concluding discussion focuses on the implications of these findings for the teaching of swimming. (TL)

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The Wisconsin State Universities Consortium of Research Development

Research Report

IDENTIFICATION OF PERSONALITY DIFFERENCES AMONG VARIOUS SWIMMING ABILITY GROUPS BY SEX

Michael G. Davis & Charles W. Stewart
Wisconsin State University - River Falls
River Falls, Wisconsin

Cooperative Research

Wisconsin State Universities
and the
United States Office of Education
Bureau of Research - Higher Education

Office of the Director - WSU-CORD
240 Main Building
Wisconsin State University
Stevens Point, Wisconsin 54481

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Michael G. Davis & Charles W. Stewart

River Falls State University

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January 1970

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TABLE OF CONTENTS

SECTION	PAGE
Acknowledgments	1
Need and Summary of Study	1
Review of Literature	2
Method	6
Sample	6
Measuring Instruments	7
Statistical Procedures	10
Analysis of Data and Findings	11
Analysis of Homogeneity of Raw Score Mean Performance on Sixteen Primary Factors by Swimming Ability and Sex	12
Procedure	14
Findings	16
Summary	24
Analysis of Homogeneity of Standard Score Mean Performance on Sixteen Primary Factors by Swimming Ability and Sex	24
Procedure	24
Findings	25
Summary	26
Analysis of Homogeneity of Standard Score Mean Performance on Seven Secondary Factors by Swimming Ability and Sex	26
Procedure	27
Findings	27
Summary	41

SECTION PAGE

Overall Summary 10

Conclusions 41

Discussion 45

References 47

TABLE

I. Subjects Qualifying for Study by Swimming Ability and Sex 8

II. Key to Abbreviations Used with Reference to Measuring Instruments 12

III. Number and Per Cent of Original Sample by Sex and Swimming Ability 12

IV. Number and Per Cent of Final Sample by Sex and Swimming Ability 13

V. Raw Score Means on Sixteen Personality Factors of the Final Sample 16

VI. Comparison of Group Raw Score Means of the Cattell Sixteen Personality Factor Questionnaire 17

VII. Comparison of Raw Score Group Means on Reserved - Outgoing Factor by Scheffe Method 20

VIII. Comparison of Group Raw Score Means on Affected by Feeling - Emotionally Stable Factor by Scheffe Method 20

IX. Comparison of Group Raw Score Means on Dumble - Assertive Factor by Scheffe Method 21

X. Comparison of Group Raw Score Means on Expedient - Conscientious Factor by Scheffe Method 21

XI. Comparison of Group Raw Score Means on Tough-Minded - Tender-Minded Factor by Scheffe Method 22

XII. Comparison of Group Raw Score Means on Trusting - Suspicious Factor by Scheffe Method 22

TABLE PAGE

VIII. Comparison of Group Raw Score Means on Practical - Imaginative Factor by Scheffe Method 22

XIV. Comparison of Group Raw Score Means on Forthright - Shrewd Factor by Scheffe Method 23

XV. Comparison of Group Raw Score Means on Self-Assured Apprehensive Factor by Scheffe Method 24

XVI. Comparison of Group Raw Score Means on Conservative - Experimenting Factor by Scheffe Method 24

XVII. Comparison of Group Raw Score Means on Relaxed - Tense Factor by Scheffe Method 25

XVIII. Standard Score Means of Sixteen Personality Factors of the Final Sample Groups 26

XIX. Comparison of Standard Score Means of the Cattell Sixteen Personality Factor Questionnaire 27

XX. Comparison of Group Standard Score Means on Humble - Assertive Factor by Scheffe Method 28

XXI. Comparison of Group Standard Score Means on the Trusting - Suspicious by Scheffe Method 28

XXII. Comparison of Group Standard Score Means on Practical - Imaginative Factor by Scheffe Method 29

XXIII. Comparison of Group Standard Score Means on the Conservative - Experimental Factor by Scheffe Method 29

XXIV. Comparison of Group Standard Score Means on the Relaxed - Tense Factor by Scheffe Method 30

XXV. Standard Score Means on Seven Personality Factors on the Final Sample Group 32

XXVI. Comparison of Standard Score Means of the Cattell Seven Personality Factor Questionnaire 33

XXVII. Comparison of Group Standard Score Means on the Low Anxiety - High Anxiety Factor by Scheffe Method . . . 34

XXVIII. Comparison of Group Standard Score Means on the Dependence - Independence Factor by Scheffe Method 34

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NEED AND SUMMARY OF STUDY

The stimuli for undertaking this study was derived from the limited amount of relevant research available on personality factors and their effect upon the acquisition of aquatic skills. The published information relating to this area has been very limited in scope and of conflicting outcomes. This study has attempted to take into consideration not only swimming ability but the effect of sex upon personality factors and swimming ability. In addition it is hoped that a more thorough knowledge of personality factors of the various groups will increase the efficacy of the learning experience.

The purpose of this study was the investigation of sixteen personality factors and their relevance to swimming proficiency on those students meeting their Physical Education requirements at Wisconsin State University at River Falls. The object of this study was to identify personality factors of male and female swimmers and non-swimmers. With this knowledge, future modification of teaching techniques may be realized.

The general hypotheses to be tested were:

1. There is no difference between swimmers and non-swimmers on sixteen primary personality factors.

2. There is no difference between females and males on sixteen primary personality factors.

3. There is no difference between swimmers and non-swimmers on the seven composite second order personality factors.

4. There is no difference between females and males on the seven composite second order personality factors.

The remainder of the study will be concerned with the review of relevant literature, methodology, findings and conclusions.

REVIEW OF LITERATURE

An inventory was administered by Flanagan (7) using 221 students divided into six groups. These groups were composed of subjects who signed up for fencing, badminton, basketball, volleyball, boxing or swimming on a voluntary basis. Flanagan's inventory was divided into four sections and was composed of the Guilford-Martin Masculinity-Femininity Scale, Allport's Ascendence-Submission Scale, Guilford's Introversion-Extroversion Scale and the Emotional Stability Scale of the Smith Human Behavior Inventory. On the basis of his analysis Flanagan's conclusions regarding swimmers were that basketball players and swimmers are more emotionally stable than any of the other groups and that boxers and swimmers attained a high rating in masculinity.

A study of eighteen underwater divers was conducted by Yonger, Dyck and Colemont (11). On the basis of their inquiry they felt that divers were above average in intelligence but tended to be introverted, neurotic and immature personalities. The authors felt many of them had a strong motivation to develop self-assurance and prove their worth.

Slusher (9) administered the Minnesota Multiphasic Personality Inventory to 400 athletes and 100 non-athletes. Of the 400 athletes, 50 were varsity swimmers. School records yielded Lorge-Thorndike Intelligence Test scores as a measure of intelligence. Slusher found the swimming group had the lowest profile of all the athletic groups, being almost identical to the non-athletes. The exceptions were the psychopathic deviate and masculinity-femininity scales, where the non-swimmers were significantly (.05) lower. In addition, the swimmers were the only athletic group who did not differ significantly from non-athletes on the hypochondriasis scale. The author concluded that the swimming group had the least neurotic profile of all the athletic groups studied.

Whiting and Stenbridge (10) classified non-swimming university males into two groups: those who had received previous instruction and those who had no previous instruction in swimming. Analysis of scores on the Maudsley Personality Inventory indicated that those in category 2 had a higher extraversion mean than category 1, but was statistically significant at the .10 level. No significant differences were found in the neuroticism scale. The Junior Maudsley Personality Inventory was given to all eleven and twelve year olds in a variety of secondary schools and a comparison of the extraversion scale was made between swimmers and persistent non-swimmers. Analysis of the combined results indicated a significant difference at the .01 level between swimmers and non-swimmers with the non-swimmers being more introverted. Highly significant differences were found at the eleven year age level and significant differences were found at the twelve year age level. The non-swimmers were more neurotic. Whiting and Stenbridge concluded on the basis of these results that more

notice should be taken of the personality of the persistant non-swimmer if better and quicker results are to be achieved in swimming instruction.

In a comparison of personality and choice between aquatics, dance, individual sports and team sports, Sheya (8) divided 100 girls into four groups according to their choice of activity. They were given the Edward's Personal Preference Schedule and analysis of this schedule showed no significant differences between the personalities of those who choose aquatics and the other three groups.

In 1967 Behrman (1) hypothesized that some non-swimmers have personality traits which make learning to swim a slow, if not impossible process. Subjects for this study were 204 male freshmen at the City College of New York. They were divided into 102 swimmers and 102 non-swimmers on the basis of being able to swim 75 feet or one pool length. These groups were later broken down into small groups for future study. Personality measurement was by the Guliford-Zimmerman Temperament Survey. This is a 300 item, 10 trait scale which covers General Activity (G), Restraint (R), Ascendence (A), Sociability (S), Emotional Stability (E), Objectivity (O), Friendliness (F), Thoughtfulness (T), Personal Relations (P), and Masculinity (M).

The specific results of the Guliford-Zimmerman survey found several scales to be significant, the author came to these conclusions:

1. Restraint (R); A non-swimmer by reason of his restrained temperament might have been over-cautious and lacked the necessary impulsiveness generally demanded in learning to swim.

2. Ascendence (A); Suggested that the greater the degree of swimming competence the more ascendent and socially bold the individual, conversely, the lower the degree of swimming ability the more submissive the individual.

3. Sociability (S); Suggested that non-swimmers were more shy and seclusive than the more sociable and outgoing swimmer.

4. Friendliness (F); The non-swimmer often lacks the aggressiveness to win, but tends to be more friendly.

General results of Behrman study suggested that swimmers are more impulsive, sociable, hostile and belligerent than non-swimmers; conversely, non-swimmers are more restrained, shy, seclusive, friendly and agreeable than swimmers.

Brown (2) selected 193 student athletes (wrestlers, skiers, swimmers) and 107 collegiate non-athletes and administered to them Edward's Personal Preference Schedule. Brown assumed that there would

be no difference in the traits of the two groups. According to Brown the pertinent results were that "the varsity swimmers group scored significantly higher than the collegiate non-athletic group when compared on the heterosexual variable. Although observable differences were present between and among the other groups, no statistically significant differences were present." The author, therefore, concluded that swimmers would be more likely to date members of the opposite sex and engage in mixed social activities.

METHOD

Sample

All students enrolled for the Physical Education requirement during the Fall Quarter of 1969 at Wisconsin State University-River Falls were required to report to the swimming pool for their first class meeting. This included 33 sections covering the activities of fencing, judo, bowling, handball, weight training, archery, scuba, beginning and advanced swimming. At this meeting all students were classified as swimmers or non-swimmers. This classification was based upon the subjects' ability to swim a distance of twenty-five yards using any stroke. All subjects were required to enter the water and at least attempt to swim the given distance.

On the basis of this classification test, four groups were formed: Male Swimmers, Male Non-Swimmers, Female Swimmers and Female Non-Swimmers. Subjects from each group were randomly (5:366) selected to take the Cattell Sixteen Personality Factor Questionnaire (3) during the second class period.

Those subjects unable to take the Sixteen Personality Factor Questionnaire during the second regular class period were tested during the following several class periods. (Table 1)

TABLE 1

SUBJECTS QUALIFYING FOR STUDY BY SWIMMING ABILITY AND SEX

Sex	Swimmers	Non-Swimmers	Total
Male	66	47	113
Females	60	47	107
Overall Total	126	94	220

Instruments

The two basic instruments used in this study were the swimming skills test and the Cattell Sixteen Personality Factor Questionnaire (3).

4

The swimming test consisted of two phases. Phase One was concerned with those who questioned their ability to swim the required twenty five yards. These subjects were required to enter the shallow end and attempt to swim the width of the pool. Those able to swim the width were then required to attempt the twenty five yard distance after a sufficient rest period. Phase Two was concerned with the remainder of the subjects who were then asked to demonstrate their swimming ability.

The Sixteen Personality Factor Questionnaire is a group, forced-choice, paper and pencil, objectively scorable test devised by basic research in psychology and attempts to give complete coverage of personality in a brief time. It was designed for the seventeen through mature adult age range.

Personality coverage is insured by sixteen functionally-independent and psychologically meaningful dimensions isolated by factor analysis on normal and clinical groups. Besides the sixteen primary traits there are seven second order composite scales available.

The sixteen primary personality factors are: (4)

FACTOR A

Reserved: Person tends to be stiff, cool, skeptical and aloof. Likes things rather than people, working alone and avoiding compromises of viewpoints. Is likely to be precise and rigid in his way of doing things and in personal standards. May tend to be critical, obstructive or hard.

Outgoing: Person tends to be good-natured, easy-going, emotionally expressive, ready to cooperate, attentive to people, soft hearted, kindly, adaptable. Likes occupations dealing with people and socially-impressive situations. Readily forms active groups. Is generous in personal relations, less afraid of criticism, better able to remember names of people.

FACTOR B

Less Intelligent: Person tends to be slow to learn and grasp, dull given to concrete and literal interpretation.

More Intelligent: Person tends to be quick to grasp ideas, a fast learner, intelligent.

FACTOR C

Affected by Feeling: Person tends to be low in frustration tolerance for unsatisfactory conditions, changeable and plastic,

evading necessary reality demands, neurotically fatigued, fretful, easily emotional and annoyed.

Emotionally Stable: Person tends to be emotionally mature, stable, realistic about life, unruffled, possessing ego strength, better able to maintain solid group morale.

FACTOR E

Humble: Person tends to give way to others, to be docile, and to conform. Is often dependent, confessing, anxious for obsessional correctness.

Assertive: Person is assertive, self-assured and independent-minded. Tends to be austere, a law to himself, hostile or extra-punitive, authoritarian and disregards authority.

FACTOR F

Sober: Person tends to be restrained, reticent, introspective. Is sometimes dour, pessimistic, unduly deliberate and considered smug and primly correct by observers. Tends to be sober, dependable person.

Happy-go-Lucky: Person tends to be cheerful, active, talkative, frank, expressive, effervescent, carefree. Is frequently chosen as an elected leader.

FACTOR G

Expedient: Person tends to be unsteady in purpose. Is often casual and lacking in effort for group undertakings and cultural demands. Freedom from group influence may lead to anti-social acts, but, at times makes him more effective, while his refusal to be bound by rules causes him to have less somatic unset from stress.

Conscientious: Person tends to be exacting in character, dominated by sense of duty, persevering, responsible, planful. Is usually conscientious and moralistic and prefers hard-working people to witty companions.

FACTOR H

Shy: Person tends to be shy, withdrawing, cautious, retiring. Usually has inferiority feelings. Tends to be slow and impeded in speech and in expressing himself, dislikes occupations with personally contacts, prefers one or two close friends to large groups.

Venturesome: Person is sociable, bold, ready to try new things, spontaneous and abundant in emotional response. Tends to be "pushy" and actively interested in the opposite sex.

FACTOR I

Tough-Minded: Person tends to practical, realistic, masculine, independent, responsible but skeptical of subjective cultural elaborations. Is sometimes unmoved, hard cynical, smug.

Tender-Minded: Person tends to be tender-minded, day-dreaming, artistic, fastidious, feminine. Is sometimes demanding of attention and help, impatient, dependent, impractical. Dislikes crude people and rough occupations. Tends to slow up group performances and to upset group morale by unrealistic fussiness.

FACTOR L

Trusting: Person tends to be free of jealous tendencies, adaptable cheerful, un-competitive, concerned about other people, a good team worker.

Suspicious: Person tends to be mistrusting and doubtful. Is often involved in his own ego, is self opinionated and interested in internal, mental life. Is usually deliberate in his actions, unconcerned about other people, a poor team member.

FACTOR M

Practical: Person tends to be anxious to do the right things, attentive to practical matters, and subject to the dictation of what is obviously possible. Is concerned over detail, able to keep his head in emergencies, but sometimes unimaginative.

Imaginative: Person tends to be unconventional, unconcerned over everyday matters, Bohemian, self-motivated, imaginatively-creative, concerned with essentials and oblivious of particular people and physical realities. Inner-directed interests sometimes lead to unrealistic situations accompanied by expressive outbursts. Individuality tends to cause him to be rejected in group activities.

FACTOR N

Forthright: Person tends to be unsophisticated, sentimental and simple. Is sometimes crude and awkward, but easily pleased and content with what comes, and is natural and spontaneous.

Shrewd: Person tends to be polished, experienced, worldly, shrewd. Is often hardheaded and analytical. Has an intellectual, unsentimental approach to situations, an approach akin to cynicism.

FACTOR O

Placid: Person tends to be placid, with unshakable nerve. He has a mature unanxious confidence in himself and his capacity to deal with things. Is resilient and secure, but to the point of being insensitive, so may evoke antipathies and distrust.

Apprehensive: Person tends to be depressed, moody, a worrier, full of foreboding, and brooding. Has a childlike tendency to anxiety in difficulties. Does not feel accepted in groups or free to participate.

FACTOR O_1

Conservative: Person is confident in what he has been taught to believe, and accepts the tried and true despite inconsistencies, is cautious and compromising in regard to new ideas. Thus, he tends to oppose and postpone change, is inclined to go along with tradition, is more conservative in religion and politics and tends not to be interested in analytical intellectual thought.

Experimenting: Person tends to be interested in intellectual matters and has doubts on fundamental issues. Is skeptical and inquiring regarding ideas, either old or new. He tends to be more well informed, less inclined to moralize, more inclined to experiment in life generally, and more tolerant of inconvenience and change.

FACTOR O_2

Group-dependent: Person prefers to work and make decisions with other people, likes and depends on social approval and admiration. Tends to go along with the group and may be lacking in individual resolution.

FACTOR Q_3

Undisciplined Self-control: Person will not be bothered with will control and regard for social demands. Is not overly considerate, careful or painstaking.

Controlled: Person tends to have strong control of his emotions and general behavior, is inclined to be socially aware and careful, and evidences what is commonly termed "self-respect" and regard for social reputation.

FACTOR Q_4

Relaxed: Person tends to be sedate, relaxed, composed and satisfied. In some situations his oversatisfaction can lead to laziness and low performance.

Tense: Person tends to be tense, excitable, restless, fretful, impatient. Is often fatigued, but unable to remain inactive. In groups he takes a poor view of the degree of unity, orderliness and leadership.

The seven secondary personality factors are:

FACTOR I

Introversion: Person tends to be shy, self-sufficient, and inhibited in interpersonal contacts. Introversion is a favorable predictor of precision workmanship.

Extroversion: Person is a socially outgoing, uninhibited person, good at making and maintaining interpersonal contacts.

FACTOR II

Low Anxiety: Person tends to be one whose life is generally satisfying and one who is able to achieve those things that seem to him to be important.

High Anxiety: Person is high on anxiety as it is commonly understood. He need not be neurotic, since anxiety could be situational. Is dissatisfied with the degree to which he is able to meet the demands of life and to achieve what he desires.

FACTOR III

Responsive Emotionality: Person is likely to be troubled by pervasive emotionality and may be of a discouraged, frustrated type. He is sensitive to the subtleties of life, likely to be artistic and rather gentle.

Alert Poise: Person is likely to be an enterprising decisive, and resilient personality. However, he is likely to miss the subtle relationships of life and to orient his behavior too much toward the obvious.

FACTOR IV

Dependence: Person is a group-dependent, chastened, passive personality. Is likely to desire and need support from other persons, and likely to orient his behavior toward persons who give such support.

Independence: Person tends to be an aggressive, independent, daring, incisive person. Will seek those situations where such behavior is at least tolerated and possibly rewarded, is likely to exhibit considerable initiative.

FACTOR V

Less Neurotic

More Neurotic

FACTOR VI

Less Leadership Potential

More Leadership Potential

FACTOR VII

Less Creative Personality

Creative Personality

Statistical Procedures

At the completion of the Sixteen Personality Factor Questionnaire the answer sheets were collected and sorted into their respective groups. These tests were then sent to National Computer Systems, Minneapolis, Minnesota, for scoring. This scoring procedure yielded raw and standard scores for the sixteen primary personality factors plus standard scores on the seven second-order composite personality factors.

These results were analyzed at the Wisconsin State University-River Falls Computer Center, using an Analysis of Variance technique. Whenever the .05 level of significance was met or exceeded, the means were compared according to Scheffe's method. Significant differences within the Scheffe method was set at the .10 level.

ANALYSIS OF DATA

The analysis of the data and a brief discussion of the findings of the investigation will be discussed in this section. The questions to be answered by the analysis were:

1. Are male swimmers and non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

2. Are female swimmers and non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

3. Are male swimmers and female swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

4. Are male non-swimmers and female non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

5. Are male swimmers and non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

6. Are female swimmers and non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

7. Are male swimmers and female swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

8. Are male non-swimmers and female non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

A brief discussion of the findings will be organized into three major sections dealing with (1) raw score mean performance on the sixteen primary personality factors, (2) standard score mean performance on the sixteen primary personality factors and (3) standard score mean performance on the seven second-order composite personality factors.

For each section information will be provided concerning the general procedures of analysis, the hypothesis and the findings. To facilitate discussion of the findings, the twenty-three measures used in the study will be presented in Table II. In discussing the findings, reference will be made to the A-Q4 or 1 - 7 designation of the variables in order to avoid repeating the complete name of the factors.

TABLE II

KEY TO ABBREVIATIONS USED WITH REFERENCE TO MEASURING INSTRUMENT

Code	Primary Traits
A	Reserved - Outgoing
B	Less Intelligent - More Intelligent
C	Affected by Feelings - Emotionally Stable
E	Humble - Assertive
F	Sober - Happy go Lucky
G	Expedient - Conscientious
H	Shy - Venturesome
I	Tough Minded - Tender Minded
L	Trusting - Suspicious
M	Practical - Imaginative
N	Forthright - Shrewd
O	Placid - Apprehensive
O_1	Conservative - Experimenting
O_2	Group Dependent - Self Sufficient
O_3	Undisciplined - Controlled
O_4	Relaxed - Tense
Code	**Secondary Scales**
I	Introversion - Extraversion
II	Low Anxiety - High Anxiety
III	Responsive Emotionality - Alert Poise
IV	Dependence - Independence
V	Less Neurotic - More Neurotic
VI	Less Leadership Potential - More Leadership Potential
VII	Less Creative Personality - Creative Personality

The number and per cent of each of the four groups enrolled for the Physical Education requirement during the Fall Quarter of 1969 at WSU-River Falls is recorded in Table III. The males and females are about equal in number and per cent, but swimming ability shows a marked difference.

The number and per cent of each of the four groups which were randomly selected from the original population and administered the Cattell Sixteen Personality Factor Questionnaire is recorded in Table IV. Here, by design, the number and per cent of males and females, swimmers and non-swimmers are about equal.

Analysis of Homogeneity of Raw Score Mean Performance on Sixteen Primary Factors by Swimming Ability and Sex

This section was designed to answer the question of whether or not the raw score mean performance on each variable was equal in each of the four groups.

TABLE III

NUMBER AND PER CENT OF ORIGINAL SAMPLE BY SEX AND SWIMMING ABILITY

	Swimmers		Non-Swimmers		Total	
Sex	Number	Percent	Number	Per Cent	Number	Per Cent
Male	195	40.46	75	15.56	270	56.02
Female	127	26.35	85	17.63	212	43.98
Total	322	66.81	160	33.19	482	100.00

TABLE IV

NUMBER AND PER CENT OF FINAL SAMPLE BY SEX AND SWIMMING ABILITY

	Swimmers		Non-Swimmers		Total	
Sex	Number	Per Cent	Number	Per Cent	Number	Per Cent
Male	66	30.00	47	21.36	113	51.36
Female	60	27.27	47	21.36	107	48.64
Total	126	57.27	94	42.73	220	100.00

Procedure

The mean performance of each of the study's sixteen measures was compared to determine if there was significant differences between the four groups by swimming ability and sex. The following specific hypotheses were tested:

H_1 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Reserved - Outgoing factor of the Cattell Sixteen Personality Factor Questionnaire.

H_2 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Less Intelligent - More Intelligent factor of the Cattell Sixteen Personality Factor Questionnaire.

H_3 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Affected by Feelings - Emotionally Stable factor of the Cattell Sixteen Personality Factor Questionnaire.

H_4 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Humble - Assertive factor of the Cattell Sixteen Personality Factor Questionnaire.

H_5 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Sober - Happy-go-Lucky factor of the Cattell Sixteen Personality Questionnaire.

H_6 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Expedient - Conscientious factor of the Cattell Sixteen Personality Questionnaire.

H_7 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Shy - Venturesome factor of the Cattell Sixteen Personality Factor Questionnaire.

H_8 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Tough Minded - Tender Minded factor of the Cattell Sixteen Personality Factor Questionnaire.

H_9 There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Trusting - Suspicious factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{10} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Practical - Imaginative factor to the Cattell Sixteen Personality Factor Questionnaire.

H_{11} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Forthright - Shrewd factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{12} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Placid - Apprehensive factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{13} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Conservative-Experimental factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{14} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Group Dependent - Self Sufficient factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{15} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Undisciplined - Controlled factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{16} There is no difference in raw score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Relaxed - Tense factor of the Cattell Sixteen Personality Factor Questionnaire.

Findings

Each of the sixteen null hypothesis was tested by means of one-way analysis of variance, followed where necessary by the Scheffe multiple comparison technique. The means tested in this section are found on Table V. The test of the various hypotheses are recorded in Tables VI-VIII. The multiple comparisons are recorded in Tables IX-XVIII. The results can be summarized as follows:

TABLE V

RAW SCORE MEANS ON SIXTEEN PERSONALITY FACTORS OF THE FINAL SAMPLE GROUPS

FACTOR	MALE SWIMMERS	MALE NON-SWIMMERS	FEMALE SWIMMERS	FEMALE NON-SWIMMERS
A	9.045	8.234	10.916	11.149
B	8.090	8.127	8.466	7.893
C	15.151	15.914	14.600	13.489
E	13.242	11.446	11.116	10.872
F	16.242	15.255	15.600	16.574
G	12.121	13.531	12.083	11.893
H	11.803	10.404	10.316	11.127
I	9.030	8.425	12.050	11.908
L	10.363	9.212	9.033	9.121
M	11.303	10.234	12.583	13.276
N	10.348	11.085	9.633	9.787
O	10.696	10.553	11.883	12.361
O_1	10.227	8.787	9.516	8.893
O_2	10.939	11.040	10.850	10.340
O_3	9.727	10.000	10.233	9.429
O_4	12.530	12.319	15.116	15.148

16

TABLE VI

COMPARISON OF GROUP RAW SCORE MEANS OF THE CATTELL SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
A	Among the Means	3	312.94	104.31	8.93	$P \leq .001$*	Reject
	Within Conditions	216	2521.83	11.67			
	Total	219	2834.77				
B	Among the Means	3	9.34	3.11	1.10	$P \leq .50$	Do not reject
	Within Conditions	216	606.09	2.80			
	Total	219	615.43				
C	Among the Means	3	149.69	49.89	4.30	$P \leq .005$*	Reject
	Within Conditions	216	2504.29	11.59			
	Total	219	2653.98				
E	Among the Means	3	211.47	70.49	4.40	$P \leq .005$*	Reject
	Within Conditions	216	3459.15	16.01			
	Total	219	3670.63				
F	Among the Means	3	53.88	17.96	.78	$P \leq .75$	Do not reject
	Within Conditions	216	4968.94	23.00			
	Total	219	5022.83				
G	Among the Means	3	83.12	27.70	2.62	$P \leq .05$*	Reject
	Within Conditions	216	2275.78	10.53			
	Total	219	2358.91				
H	Among the Means	3	87.56	29.18	1.12	$P \leq .50$	Do not reject
	Within Conditions	216	5611.97	25.98			
	Total	219	5699.54				

TABLE VI (CONTINUED)

COMPARISON OF GROUP RAW SCORE MEANS OF THE CATTELL
SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
I	Among the Means	3	562.17	187.39	21.81	$P \leq .001$*	Reject
	Within Conditions	216	1855.55	8.59			
	Total	219	2417.72				
L	Among the Means	3	70.63	23.54	2.67	$P \leq .05$*	Reject
	Within Conditions	216	1904.35	8.81			
	Total	219	1974.99				
M	Among the Means	3	270.39	90.13	8.79	$P \leq .001$*	Reject
	Within Conditions	216	2214.35	10.25			
	Total	219	2484.74				
N	Among the Means	3	65.53	21.84	3.68	$P \leq .025$*	Reject
	Within Conditions	216	1280.45	5.92			
	Total	219	1345.98				
O	Among the Means	3	123.15	41.05	2.90	$P \leq .05$*	Reject
	Within Conditions	216	3052.59	14.13			
	Total	219	3175.74				
Q_1	Among the Means	3	75.31	25.10	3.77	$P \leq .025$*	Reject
	Within Conditions	216	1434.91	6.64			
	Total	219	1510.23				
Q_2	Among the Means	3	14.10	4.70	.36	$P \leq .90$	Do not reject
	Within Conditions	216	2785.87	12.89			
	Total	219	2799.98				

TABLE VI (CONTINUED)

COMPARISON OF GROUP RAW SCORE MEANS OF THE CATTELL SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
O_3	Among the Means	3	16.86	5.62	.61	$P \leq .75$	Do not reject
	Within Conditions	216	1987.57	9.20			
	Total	219	2004.43				
O_4	Among the Means	3	398.45	132.81	5.36	$P \leq .005$*	Reject
	Within Conditions	216	5344.79	24.74			
	Total	219	5743.25				

* Significant at α .05

TABLE VII

COMPARISON OF RAW SCORE GROUP MEANS ON
RESERVED - OUTGOING FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	1.548	$P \leq .75$	Do not reject
Male Swimmers With Female Swimmers	9.433	$P \leq .025$	Reject
Male Non-Swimmers With Female Non-Swimmers	17.118	$P \leq .001$	Reject
Female Swimmers With Female Non-Swimmers	.121	$P \leq .99$	Do not reject

TABLE VIII

COMPARISON OF GROUP RAW SCORE MEANS ON AFFECTED BY
FEELING-EMOTIONALLY STABLE FACTOR BY SCHEFFE METHOD

GROUP	F	NIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	1.379	$P \leq .75$	Do not reject
Male Swimmers With Female Swimmers	.826	$P \leq .90$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	11.929	$P \leq .01$	Reject
Female Swimmers With Female Non-Swimmers	2.811	$P \leq .50$	Do not reject

TABLE IX

COMPARISON OF GROUP RAW SCORE MEANS ON HUMBLE - ASSERTIVE FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	5.533	$P \leq .25$	Do not reject
Male Swimmers With Female Swimmers	8.880	$P \leq .05$	Reject
Male Non-Swimmers With Female Non-Swimmers	.483	$P \leq .95$	Do not reject
Female Swimmers With Female Non-Swimmers	.098	$P \leq .995$	Do not reject

TABLE X

COMPARISON OF GROUP RAW SCORE MEANS ON EXPEDIENT - CONSCIENTIOUS FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	5.177	$P \leq .25$	Do not reject
Male Swimmers With Female Swimmers	.004	$P \leq .999$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	5.989	$P \leq .25$	Do not reject
Female Swimmers With Female Non-Swimmers	.090	$P \leq .995$	Do not reject

21

TABLE XI

COMPARISON OF GROUP RAW SCORE MEANS ON TOUGH-MINDED - TENDER-MINDED FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	1.170	$P \leq .75$	Do not reject
Male Swimmers With Female Swimmers	33.407	$P \leq .001$	Reject
Male Non-Swimmers With Female Non-Swimmers	31.356	$P \leq .001$	Reject
Female Swimmers With Female Non-Swimmers	.179	$P \leq .99$	Do not reject

TABLE XII

COMPARISON OF GROUP RAW SCORE MEANS ON TRUSTING - SUSPICIOUS FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	4.128	$P \leq .25$	Do not reject
Male Swimmers With Female Swimmers	6.318	$P \leq .10$	Reject
Male Non-Swimmers With Female Non-Swimmers	.001	$P \leq .999$	Do not reject
Female Swimmers With Female Non-Swimmers	.075	$P \leq .995$	Do not reject

TABLE XIII

COMPARISON OF GROUP RAW SCORE MEANS ON PRACTICAL - IMAGINATIVE FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	3.064	$P \leq .50$	Do not reject
Male Swimmers With Female Swimmers	4.575	$P \leq .25$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	21.225	$P \leq .001$	Reject
Female Swimmers With Female Non-Swimmers	1.234	$P \leq .75$	Do not reject

TABLE XIV

COMPARISON OF GROUP RAW SCORE MEANS ON FORTHRIGHT - SHREWD FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	2.514	$P \leq .50$	Do not reject
Male Swimmers With Female Swimmers	2.718	$P \leq .50$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	6.687	$P \leq .10$	Reject
Female Swimmers With Female Non-Swimmers	.555	$P \leq .95$	Do not reject

TABLE XV

COMPARISON OF GROUP RAW SCORE MEANS ON SELF-ASSURED - APPREHENSIVE FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	.040	$P \leq .999$	Do not reject
Male Swimmers With Female Swimmers	3.134	$P \leq .50$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	5.436	$P \leq .25$	Do not reject
Female Swimmers With Female Non-Swimmers	.426	$P \leq .95$	Do not reject

TABLE XVI

COMPARISON OF GROUP RAW SCORE MEANS ON CONSERVATIVE - EXPERIMENTING FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	11.322	$P \leq .025$	Reject
Male Swimmers With Female Swimmers	2.393	$P \leq .50$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	.040	$P \leq .999$	Do not reject
Female Swimmers With Female Non-Swimmers	1.541	$P \leq .75$	Do not reject

TABLE XVII

COMPARISON OF GROUP RAW SCORE MEANS ON
RELAXED - TENSE FACTOR BY SCHEFFE METHOD

GROUP	F	SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	.049	$P \leq .999$	Do not reject
Male Swimmers With Female Swimmers	8.497	$P \leq .05$	Reject
Male Non-Swimmers With Female Non-Swimmers	7.620	$P \leq .10$	Reject
Female Swimmers With Female Non-Swimmers	.001	$P \leq .999$	Do not reject

A. No swimming skill differences were found within the sexes on the Reserved - Outgoing factor.
Significant differences were found between sexes for both swimmers and non-swimmers on the Reserved - Outgoing factor. The females tended to be more outgoing.

B. No swimming skill or sex differences were found in intelligence.

C. Male non-swimmers showed significantly higher scores on Emotional - Stability compared with female non-swimmers.

E. Male swimmers were found to be more assertive than female swimmers.

F. No swimming skill or sex differences were found in the Sober - Happy-go-Lucky factor.

G. No swimming skill or sex differences were found in the Expedient - Conscientious factor.

H. No swimming skill or sex differences were found in the Shy - Venturesome factor.

I. Female swimmers and non-swimmers were found to be more Tender-Minded than male swimmers or non-swimmers.

L. Male swimmers were more Suspicious than female swimmers.

M. Female non-swimmers were more Imaginitive than male non-swimmers.

N. Male non-swimmers were found to be more Shrewd than female non-swimmers.

O. No swimming skill or sex differences were found in the Self-Assured - Apprehensive factor.

Q_1 Male swimmers were more Experimental than male non-swimmers.

Q_2 No swimming skill or sex differences were found in the Group-Dependent - Self Sufficient factor.

Q_3 No swimming skill or sex differences were found in the Undisciplined - Controlled factor.

Q_4 Female swimmers and non-swimmers were more Tense than male swimmers and non-swimmers.

Summary Results of Swimming Ability

The results of this aspect of the study show that male swimmers tend to be more experimenting, critical, liberal and more tolerant of inconvenience and change than male non-swimmers.

Summary Results of Sex Differences

According to this investigation the male swimmers, compared with female swimmers, were more assertive, independent minded, mistrusting and very self-opinionated. The male non-swimmer, contrasted with the female non-swimmer, were emotionally mature, shrewd, wordly and analytical.

Female swimmers, compared with male swimmers, tended to be more good-natured, outgoing and cooperative. They were also more tender minded, dependent, feminine, self-motivated and inner directed. The female non-swimmers, compared with male non-swimmers were more good-natured, cooperative, dependent, sensitive, over-protected and impatient.

Analysis of Homogeneity of Standard Score Mean Performance on Sixteen Primary Factors by Swimming Ability and Sex

The second section was designed to answer the question of whether or not the standard score mean performance on each variable was equal in each of the four groups.

Procedure The mean performance of the study's sixteen measures was compared to determine if there were significant differences between the four groups by swimming ability and sex. The following specific hypothesis were tested:

H_{17} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Reserved - Outgoing factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{18} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Less Intelligent - More Intelligent factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{19} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Affected by Feelings - Emotionally Stable Factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{20} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Humble - Assertive factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{21} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Sober - Happy-go-Lucky factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{22} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Expedient - Conscientious factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{23} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Shy - Venturesome factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{24} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Tough Minded - Tender Minded factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{25} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Trusting - Suspicious factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{26} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Practical - Imaginative factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{27} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Forthright - Shrewd factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{28} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers, and female non-swimmers on the Placid - Apprehensive factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{29} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Conservative - Experimental factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{30} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Group Dependent - Self Sufficient factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{31} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Undisciplined - controlled factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{32} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers of the Relaxed - Tense factor of the Cattell Sixteen Personality Factor Questionnaire.

Findings

Each of the sixteen null hypotheses was tested by means of a one - way analysis of variance, followed where necessary by a Scheffe multiple comparison technique. The means tested in this section are found on Table XVIII. The test of the various hypotheses is recorded in Table XIX. The multiple comparisons are recorded in Tables XX - XXIV. The results can be summarized as follows:

TABLE XVIII

STANDARD SCORE MEANS OF SIXTEEN PERSONALITY FACTORS
OF THE FINAL SAMPLE GROUPS

FACTOR	MALE SWIMMERS	MALE NON-SWIMMERS	FEMALE SWIMMERS	FEMALE NON-SWIMMERS
A	5.047	4.609	5.072	5.153
B	6.061	6.106	6.400	5.830
C	5.258	5.670	5.507	4.957
E	5.179	4.245	5.628	5.485
F	5.983	5.549	5.870	6.272
G	5.180	5.940	5.527	5.402
H	5.062	4.562	4.712	5.043
I	5.638	5.304	5.647	5.515
L	5.994	5.272	6.302	6.391
M	5.267	4.664	5.583	5.945
N	5.038	5.589	4.908	5.002
O	5.798	5.753	6.380	6.621
Q_1	5.964	4.968	6.147	5.696
Q_2	6.039	6.087	6.155	5.851
Q_3	5.270	5.455	5.257	4.789
Q_4	5.630	5.562	6.370	6.396

TABLE XIX

COMPARISON OF STANDARD SCORE MEANS OF THE CATTELL SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
A	Among the Means	3	8.69	2.90	.82	$P \leq .50$	Do not reject
	Within Conditions	216	756.86	3.50			
	Total	219	765.55				
B	Among the Means	3	8.90	2.97	.94	$P \leq .50$	Do not reject
	Within Conditions	216	677.26	3.14			
	Total	219	686.16				
C	Among the Means	3	14.10	4.70	1.50	$P \leq .25$	Do not reject
	Within Conditions	216	674.83	3.12			
	Total	219	688.93				
E	Among the Means	3	57.52	19.17	4.85	$P \leq .005$*	Reject
	Within Conditions	216	852.51	3.95			
	Total	219	910.03				
F	Among the Means	3	12.70	4.23	.89	$P \leq .50$	Do not reject
	Within Conditions	216	1024.22	4.74			
	Total	219	1036.92				
G	Among the Means	3	16.30	5.43	1.64	$P \leq .25$	Do not reject
	Within Conditions	216	713.02	3.30			
	Total	219	729.32				

TABLE XIX (CONTINUED)

COMPARISON OF STANDARD SCORE MEANS OF THE CATTELL SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
H	Among the Means	3	9.76	3.25	.86	$P \leq .50$	Do not reject
	Within Conditions	216	812.76	3.76			
	Total	219	822.52				
I	Among the Means	3	3.96	1.32	.43	$P \leq .75$	Do not reject
	Within Conditions	216	656.70				
	Total	219	660.66				
L	Among the Means	3	37.54	12.52	3.76	$P \leq .025$*	Reject
	Within Conditions	216	717.40				
	Total	219	754.94				
M	Among the Means	3	42.40	14.13	4.17	$P \leq .01$ *	Reject
	Within Conditions	216	730.36				
	Total	219	772.76				
N	Among the Means	3	14.13	4.71	1.47	$P \leq .25$	Do not reject
	Within Conditions	216	689.66				
	Total	219	703.79				
O	Among the Means	3	29.01	96.70	2.57	$P \leq .10$	Do not reject
	Within Conditions	216	812.36				
	Total	219	841.37				

TABLE XIX (CONTINUED)

COMPARISON OF STANDARD SCORE MEANS OF THE CATTELL SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Q_1	Among the Means	3	41.32	13.77	4.29	$P \leq .005$*	Reject
	Within Conditions	216	693.28	3.21			
	Total	219	734.60				
Q_2	Among the Means	3	2.58	.86	.21	$P \leq .999$	Do not reject
	Within Conditions	216	852.66				
	Total	219	855.24				
Q_3	Among the Means	3	11.50	3.83	1.01	$P \leq .50$	Do not reject
	Within Conditions	216	818.65	3.79			
	Total	219	830.15				
Q_4	Among the Means	3	33.54	11.18	2.80	$P \leq .05$*	Reject
	Within Conditions	216	861.38				
	Total	219	894.92				

TABLE XX

COMPARISON OF GROUP STANDARD SCORE MEANS ON
HUMBLE - ASSERTIVE FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	6.071	P≤ .25	Do not reject
Male Swimmers With Female Swimmers	1.605	P≤ .75	Do not reject
Male Non-Swimmers With Female Non-Swimmers	9.158	P≤ .05*	Reject
Female Swimmers With Female Non-Swimmers	.133	P≤ .99	Do not reject

TABLE XXI

COMPARISON OF GROUP STANDARD SCORE MEANS ON THE
TRUSTING - SUSPICIOUS BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	4.316	P≤ .25	Do not reject
Male Swimmers With Female Swimmers	.896	P≤ .90	Do not reject
Male Non-Swimmers With Female Non-Swimmers	8.862	P≤ .05	Reject
Female Swimmers With Female Non-Swimmers	.070	P≤ .999	Do not reject

TABLE XXII

COMPARISON OF GROUP STANDARD SCORE MEANS ON
PRACTICAL - IMAGINATIVE FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	2.954	P≤ .50	Do not reject
Male Swimmers With Female Swimmers	.928	P≤ .90	Do not reject
Male Non-Swimmers With Female Non-Swimmers	11.403	P≤ .01	Reject
Female Swimmers With Female Non-Swimmers	.800	P≤ .90	Do not reject

TABLE XXIII

COMPARISON OF GROUP STANDARD SCORE MEANS ON THE
CONSERVATIVE - EXPERIMENTAL FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	8.486	P≤ .05	Reject
Male Swimmers With Female Swimmers	.327	P≤ .975	Do not reject
Male Non-Swimmers With Female Non-Swimmers	3.882	P≤ .50	Do not reject
Female Swimmers With Female Non-Swimmers	.167	P≤ .99	Do not reject

TABLE XXIV

COMPARISON OF GROUP STANDARD SCORE MEANS ON THE RELAXED - TENSE FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	.033	$P \leq .999$	Do not reject
Male Swimmers With Female Swimmers	4.319	$P \leq .25$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	4.894	$P \leq .25$	Do not reject
Female Swimmers With Female Non-Swimmers	.004	$P \leq .9999$	Do not reject

A. No swimming skill or sex differences were found in the Reserved - Outgoing factor.

B. No swimming skill or sex differences were found in the Intelligence factor.

C. No swimming skill or sex differences were found in the Emotional - Stability factor.

E. Female non-swimmers were found to be more assertive than male non-swimmers.

F. No swimming skill or sex differences were found in the Sober - Happy-go-Lucky factor.

G. No swimming skill or sex differences were found in the Expedient - Conscientious factor.

H. No swimming skill or sex differences were found in the Shy - Venturesome factor.

I. No swimming skill or sex differences were found in the Tough-Minded - Tender-Minded factor.

L. Female non-swimmers were more suspicious than male non-swimmers.

M. Female non-swimmers were more imaginative than male non-swimmers.

N. No swimming skill or sex differences were found in the Forthright - Shrewd factor.

O. No swimming skill or sex differences were found in the Self-Assured - Apprehensive factor.

Q_1. Male swimmers were more experimenting than male non-swimmers.

Q_2. No swimming skill or sex differences were found in the Group-Dependent - Self-Sufficient factor.

Q_3. No swimming skill or sex differences were found in the Undisciplined Self-Conflict - Controlled factor.

Q_4. No swimming skill or sex differences were found in the Relaxed - Tense factor.

Summary Results of Swimming Ability

The results of this aspect of the study show that male swimmers tend to be more experimenting, critical, liberal and more tolerant of inconvenience and change than male non-swimmers.

Summary Results of Sex Differences

According to this study the male swimmers compared with female swimmers, were more assertive, independent minded, mistrusting and very self-opinionated. The male non-swimmer, contrasted with the female non-swimmer, was more emotionally mature, realistic about life, shrewd, hardheaded and analytical.

Female swimmers, compared with male swimmers, tended to be more good natured, cooperative, easygoing, tender-minded, over-protected, and sensitive. The female non-swimmers, compared with male non-swimmers, were more good natured, cooperative, easygoing, tender-minded, dependent, over-protected, and sensitive. They were also more imaginative, self-motivated and inner-directed.

Analysis of Homogeneity of Standard Score Mean Performance on Seven Secondary Factors by Swimming Ability and Sex.

The third section was designed to answer the question of whether or not the standard score mean performance on each variable was equal in each of the four groups.

Procedure The mean performance of the study's seven second-order composite measures were compared to determine if there were significant differences between the four groups by swimming ability and sex. The following specific hypotheses were tested:

H_{33} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Introversion - Extraversion factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{34} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Low Anxiety - High Anxiety factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{35} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Responsive - Emotionality - Alert Poise factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{36} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Dependence - Independence factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{37} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers and female non-swimmers on the Less Neurotic - More Neurotic factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{38} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers, female non-swimmers on the Less Leadership Potential - More Leadership Potential factor of the Cattell Sixteen Personality Factor Questionnaire.

H_{39} There is no difference in standard score means of male swimmers, male non-swimmers, female swimmers, female non-swimmers on the Less Creative Personality - Creative Personality factor of the Cattell Sixteen Personality Factor Questionnaire.

Findings Each of the seven null hypotheses was tested by means of a one-way analysis of variance, followed where necessary by a Scheffe multiple comparison technique. The means tested in section are found on Table XXV. The test of the various hypotheses is recorded in Table XXVI. The multiple comparisons are recorded in Tables XXVII-XXVIII. The results can be summarized as follows:

TABLE XXV

STANDARD SCORE MEANS ON SEVEN PERSONALITY FACTORS ON THE FINAL SAMPLE GROUP

FACTOR	MALE SWIMMERS	MALE NON-SWIMMERS	FEMALE SWIMMERS	FEMALE NON-SWIMMERS
1.	5.215	4.472	5.175	5.479
2.	5.892	5.698	6.433	6.643
3.	5.588	6.000	5.583	5.538
4.	5.829	4.849	6.130	5.940
5.	5.511	5.572	5.715	5.947
6.	5.144	5.321	4.922	4.704
7.	5.894	5.487	6.187	5.664

TABLE XXVI

COMPARISON OF STANDARD SCORE MEANS OF THE CATTELL SEVEN PERSONALITY FACTOR QUESTIONNAIRE

FACTOR	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F RATIO	STATISTICAL SIGNIFICANCE	HYPOTHESIS
	Among the Means	3	26.47	8.82	1.75	P≤ .25	Do not reject
1	Within Conditions	216	1083.87	5.02			
	Total	219	1110.34				
	Among the Means	3	30.19	10.06	2.67	P≤ .05	Reject
2	Within Conditions	216	812.78	3.76			
	Total	219	842.97				
	Among the Means	3	6.82	2.27	.86	P≤ .50	Do not reject
3	Within Conditions	216	567.98	2.63			
	Total	219	574.80				
	Among the Means	3	48.81	16.26	5.12	P≤ .005	Reject
4	Within Conditions	216	685.31	3.17			
	Total	219	734.12				
	Among the Means	3	5.85	1.95	.47	P≤ .75	Do not reject
5	Within Conditions	216	894.29	4.14			
	Total	219	900.13				
	Among the Means	3	10.53	3.51	1.01	P≤ .50	Do not reject
6	Within Conditions	216	749.68	3.48			
	Total	219	760.22				
	Among the Means	3	14.71	4.90	1.26	P≤ .50	Do not reject
7	Within Conditions	216	840.49	2.89			
	Total	219	855.20				

TABLE XXVII

COMPARISON OF GROUP STANDARD SCORE MEANS ON THE
LOW ANXIETY - HIGH ANXIETY FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	.5682	$P \leq .95$	Do not reject
Male Swimmers With Female Swimmers	3.596	$P \leq .50$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	5.578	$P \leq .25$	Do not reject
Female Swimmers With Female Non-Swimmers	.309	$P \leq .96$	Do not reject

TABLE XXVIII

COMPARISON OF GROUP STANDARD SCORE MEANS ON THE
DEPENDENCE - INDEPENDENCE FACTOR BY SCHEFFE METHOD

GROUP	F	STATISTICAL SIGNIFICANCE	HYPOTHESIS
Male Swimmers With Male Non-Swimmers	5.246	$P \leq .25$	Do not reject
Male Swimmers With Female Swimmers	.569	$P \leq .95$	Do not reject
Male Non-Swimmers With Female Non-Swimmers	5.560	$P \leq .25$	Do not reject
Female Swimmers With Female Non-Swimmers	.189	$P \leq .99$	Do not reject

I. No swimming skill or sex differences were found in the Introversion - Extroversion factor.

II. No swimming skill or sex differences were found in the Low Anxiety - High Anxiety factor.

III. No swimming skill or sex differences were found in the Responsive - Emotionally - Alert Poise factor.

IV. No swimming skill or sex differences were found in the Dependence - Independence factor.

V. No swimming skill or sex differences were found in the Less Neurotic - More Neurotic factor.

VI. No swimming skill or sex differences were found in the Less Leadership Potential - More Leadership Potential factor.

VII. No swimming skill or sex differences were found in the Less Creative Personality - Creative Personality factor.

Summary Results of Swimming Ability

The results of this aspect of the investigation show that there were no differences in second-order factors on the basis of personality.

Summary Results of Sex Differences

The results of this research show that there were no differences in second-order personality factors on the basis on sex.

OVERALL SUMMARY

The purpose of this study was the investigation of sixteen personality factors and their relevance to swimming proficiency of those students enrolled in the required physical education program at Wisconsin State University-River Falls. The objective of this study was to identify personality factors of male and female swimmers and non-swimmers.

The general hypothesis to be tested were:

1. There is no difference between swimmers and non swimmers on sixteen primary personality factors
2. There is no difference between females and males on sixteen primary personality factors
3. There is no difference between swimmers and non-swimmers on the seven composite second order personality factors
4. There is no difference between females and males on the seven composite second order personality factors

The sample was obtained by having all students enrolled for their required physical education requirements report to the swimming pool for their first class meeting. At this session all students were classified as swimmers and non-swimmers. This classification was based upon the subjects ability to swim a distance of twenty-five yards of any stroke. A total of 105 male swimmers, (105); seventy-five male non-swimmers, (75); 107 female swimmers, (107); and 75 female non-swimmers, (75) qualified for the study.

Four groups were randomly selected from the original population and administered the Cattell Sixteen Personality Factor Questionnaire. Sixty-six male swimmers, (66); forty seven male non-swimmers, (47); sixty female swimmers, (60); and forty-seven female non-swimmers, (47) were assigned to the study. Hence, by design, the number and per cent of males and females, swimmers and non-swimmers were about equal.

The two basic instruments used in this study were the swimming skills test and the Cattell Sixteen Personality Factor Questionnaire. All students were required to at least attempt the distance of twenty five yards. The only criterion for being classified a swimmer was the ability to perform the distance employing any stroke or form. The Sixteen Personality Factor Questionnaire is a group, forced-choice, paper and pencil, objectively scorable test. Personality coverage is insured by sixteen functionally-independent and psychologically meaningful dimensions isolated by factor analysis on normal and clinical groups. Besides the sixteen primary traits there are seven second order composite scales available.

At the completion of the Sixteen Personality Factor Questionnaire the answer sheets were collected and sorted into their respective groups and sent to National Computer Systems, Minneapolis, Minnesota, for scoring. This scoring procedure gave raw and standard scores on the sixteen primary personality factors plus standard scores on the seven second-order personality factors. These results were analyzed at the Wisconsin State University-River Falls Computer Center, using an Analysis of Variance technique. Whenever a statistically significant result was found at the .05 level of significance, a comparison of the means was run using Scheffe's procedure. Significant differences within the Scheffe method was set at the .10 level.

The analysis of the data attempted to answer the following questions:

1. Are male swimmers and non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

2. Are female swimmers and non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

3. Are male swimmers and female swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

4. Are male non-swimmers and female non-swimmers homogeneous with respect to mean performance on each of the sixteen primary personality factors?

5. Are male swimmers and non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

6. Are female swimmers and non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

7. Are male swimmers and female swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

8. Are male non-swimmers and female non-swimmers homogeneous with respect to mean performance on each of the seven composite second-order personality factors?

The summary of the raw score data indicated that male swimmers tend to be more experimenting, critical, liberal and more tolerant of inconvenience and change than male non-swimmers. Male swimmers compared

with female swimmers, were more assertive, independent minded, mistrsting and very self opinionated. The male non-swimmers, contrasted with the female non-swimmer, were emotionally mature and analytical. Female swimmers compared with male swimmers, tended to be more good-natured and cooperative. They were also more dependent, feminine and inner directed. The female non-swimmers, compared with male non-swimmers, were more cooperative, sensitive, impatient and dependent.

The results of the standard scores show that male swimmers tend to be more experimental, liberal and more tolerant of change than male non-swimmers. Male swimmers, compared with female swimmers, were more assertive, mistrusting, and self-opinionated. The male non-swimmers, contrasted with the female non-swimmers, were more mature, shrewd, and analytical. The female swimmers, compared with male swimmers, were more mature, easygoing, and sensitive. The female non-swimmer, compared with male non-swimmers, tended to be more good-natured, easygoing, sensitive, and dependent. They were also more imaginative and inner directed.

The results of the standard scores on the seven second-order personality factors show that there were no differences on the basis of personality with regard to swimming ability and/or sex.

Conclusions:

Results of both raw and standard scores on the sixteen primary personality factors seems to indicate that:

1. Male swimmers, compared with male non-swimmers, tend to be skeptical, yet, willing to experiment with life generally. They are also liberal in their views and tolerant of inconvenience and change.

2. Male swimmers, compared with female swimmers, appear to be suspicious but assertive and independent minded. They also tend to be authoritarian because they are self-opinionated and disregard authority.

3. Male non-swimmers, compared with female non-swimmers, are inclined to be realistic about life and emotionally mature. However, they appear shrewd and have an unsentimental approach to situations.

4. Female swimmers, compared with male swimmers, tend to be good-natured, cooperative and like people and social situations. These people are sensitive, feminine, dependent individuals who sometime demand attention and help.

5. Female non-swimmers, compared to male non-swimmers, tend to be good-natured, cooperative and like people and social situations. These people are sensitive, feminine, dependent individuals who sometimes demand attention and help.

Results of standard scores on seven second-order composite personality factors indicate that:

1. No differences can be found between swimmers and non-swimmers.

2. No differences can be found between males and females.

Discussion:

It would appear as if there are very few personality differences between swimmers and non-swimmers. The limited findings in this area seem to indicate that male swimmers tend to be more experimental and flexible: therefore, the instructor could try a variety of techniques and activities.

A number of differences were found between personality factors between the sexes. Male swimmers tended to be more suspicious, independent and assertive than female swimmers. The males were also more self-opinionated and prone to disregard authority. Whereas the female swimmers, tended to be more good-natured, cooperative and sociable. This sex difference was further emphasized by the fact that the female swimmers were also more sensitive, feminine, dependent and demanding than the male swimmers.

Because of these factors found in male swimmers, the instructor should try to establish good rapport while having few but definite rules. The assertiveness can be used as a means of developing competitive spirit within the class. The personality characteristics found within female swimmers would seem to indicate that these people would benefit from more individual attention, encouragement and less direct criticism. Competition within the dass should be used sparingly.

Male non-swimmers had a better grasp of life in general and were more emotionally mature when contrasted with female non-swimmers. The female swimmers were inclined to be more good-natured, cooperative and sociable. This sex difference was further emphasized by the fact that the female swimmers were also more sensitive, feminine, dependent and demanding than the male non-swimmers.

An instructor might be able to place a group of male non-swimmers in a more stressful learning situation with a minimum of emotional "trauma." The personality characteristics found within female non-swimmers would seem to indicate that these people could benefit from individual attention and support in a relaxed learning situation. Competition within the class should be used sparingly.

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